A Framework and Approach for Analysis of Focus Group Data in Information Systems Research

Alireza Nili
School of Information Management
Victoria University of Wellington, New Zealand
nili.irnz@gmail.com

Mary Tate
Information Systems School
Queensland University of Technology, Australia

David Johnstone
School of Information Management
Victoria University of Wellington, New Zealand

Abstract:

A significant part of information systems research studies people as a part of a system, organization, network, or community. Since this research focuses on data related to the interaction of individuals, focus groups can provide data that cannot be obtained through any other method. However, compared with the abundance of handbooks and guidelines on how to plan and conduct focus groups, little methodological literature is available on how to analyze focus group data. In this paper, we provide a systematic and integrative approach for qualitatively analyzing different types of focus group data (e.g., group level content and interaction data) for information systems (IS) researchers. While we focus on IS research, our framework is also relevant to other applied business fields.

Keywords: Focus Group, Qualitative Analysis, Analysis Framework, Information Systems.

1 Introduction

Focus groups are a social method of obtaining research data through informal group discussions on a specific topic (O'hEocha, Wang, & Conboy, 2012; Parent, Gallupe, Salisbury, & Handelman, 2000). Compared to other methods such as individual interviews and surveys, the interactive and synchronous group discussion aspect of focus groups allows participants to discuss, agree, or dissent with each other's ideas and to elaborate the opinions they have already mentioned. Therefore, the method not only helps one attain a deeper shared meaning of responses that enhances the trustworthiness of research results (Kitzinger, 1994; Stahl, Tremblay, & LeRouge, 2011) but also provides the unique opportunity to obtain rich group interaction data (Onwuegbuzie, Dickinson, Leech, & Zoran, 2009; Stahl et al., 2011). This data is valuable for conceptualization and theorizing, especially for studies which explore the behaviors of individuals as part of a social system (Belanger, 2012). Such systems are popular foci for information systems (IS) research, much of which uses the focus group method. Examples include user behavior in social networks (Hundley & Shyles, 2010), the evaluation of e-service quality of libraries (Einasto, 2014), consumer social interaction and online group buying behavior (Zhang & Gu, 2015), artifact refinement and evaluation in design (Tremblay, Hevner, & Berndt, 2010), and group decision making and planning (Glitz, Hamasu, & Sandstrom, 2001). However, compared with the abundance of guidelines on how to plan and conduct focus groups (e.g., Liamputtong 2011; Stewart & Shamdasani, 2014; Wilkinson, 2004), there is little methodological literature on how to *analyze* focus group data (e.g., Grønkjær, Curtis, Crespigny, & Delmar, 2011; Halkier, 2010; Kitzinger, 1994; Onwuegbuzie et al., 2009; Vicsek, 2007) in the IS and social science literature. Indeed, many researchers assume that general guidelines for qualitative data analysis will suffice (Onwuegbuzie et al., 2009; Stewart & Shamdasani, 2014). In this paper, we develop a systematic and integrative approach for qualitatively analyzing different types of focus group data (e.g., group level content and interaction data). We focus our framework specifically on IS researchers, but it is also relevant to other applied business fields.

Social science and IS researchers have challenged and criticized qualitative data-analysis methods for being unsystematic and ambiguous (Grover & Lyytinen, 2015). This characteristic of qualitative data analysis has been a topic of debates and repeated calls for new data analysis approaches and advances in the last three decades (e.g., Chen & Hirschheim, 2004; Galliers, 1991; Hirschheim, 1985; Orlikowski & Baroudi, 1991; Ramiller & Pentland, 2009). Concerns regarding the process of analyzing qualitative data become even more critical when it comes to analyzing focus group data because little guidance exists. Methodological handbooks (e.g., Liamputtong, 2011; Krueger, 1997; Stewart & Shamdasani, 2014; Wilkinson, 2004) and papers (e.g., Bertrand, Brown, & Ward, 1992; Krueger, 2006; Moretti et al., 2011; Onwuegbuzie et al., 2009; Parent et al., 2000; Smithson, 2000; Vicsek, 2007; O'hEocha et al., 2012) specifically written about focus group method provide little information on analyzing focus group data or simply refer readers to general qualitative data analysis methods that are mainly useful for analyzing individual-level data such as transcripts of individual interviews. Consistent with this assertion, Onwuegbuzie et al. (2009, p. 15) state that "despite the widespread use of focus groups…, it is surprising that few explicit guidelines exist on how to analyze focus group data in social science research".

Some studies (e.g., Kitzinger, 1994) have advocated for the importance of capturing interaction data in groups through, for example, conducting unstructured sessions with acquaintances who have a unified goal but potentially different views (e.g., managers and administrators of an organization, teaching staff with prior interactions, and nurses at a department of a hospital). While some studies on the analysis of focus group method have emphasized the importance of analyzing both group level content and group interaction data (e.g., Grønkjær et al., 2011; Kitzinger, 1994; Onwuegbuzie et al., 2009; Smithson, 2000; Stahl et al., 2011; O'hEocha et al., 2012), no study has suggested a systematic procedure of analyzing these two types of data in an integrated way. Such lack of a detailed and systematic procedure of analyzing focus group data may explain the paucity of IS research papers and doctoral dissertations that report group-level content data and interaction data from focus groups.

One could ask whether a research framework specifically for information systems is required for analyzing focus group data. We believe that it is for several reasons. Firstly, information systems has a unique focus on the interactions between people and technology. Benbasat and Zmud (2003) suggest that IS research should focus on the IS artifact and its nomological net, which includes the use and impact of IT artifacts and the capabilities and practices required to develop and manage them. In a similar line, Tate and Evermann (2009) argue that the focal domain for IS theories of attitudes and behaviors towards technology should be the intersection between the universe of possible affordances of a technology artefact and a customer's physical and mental characteristics and past experience, which means the focus is neither the specific

internal characteristics of the technology nor the internal psychological states or social interactions of the customer but the inter-relationship between them as perceived by the customer. This conceptualization provides guidance for the level of theoretical sensitivity required for analyzing focus group data in information systems research.

Benbasat and Zmud (2003) argue that IS scholars should avoid research that examines "constructs best left to scholars in other disciplines" because it involves an "error of inclusion" (p. 190) of constructs that are the proper domain of fields outside IS. When we consider this argument in the context of focus group method, we can see that focus groups are valuable for IS research that aims to capture the perceptions of a group of people towards any aspect of an IT artefact or its nomological net. We can also see that a research focus on the characteristics of the group itself, or the group dynamics, is likely to result in an error of inclusion by focusing on psychological constructs best left to psychologists. Therefore, many IS topics likely require a certain level of sensitivity to interactions in a group (e.g., to determine the extent of agreement or disagreement with a statement), but it is relatively unlikely that they would require specialized psychological analysis of the interactions of focus group members. We provide field-specific guidelines that capture an appropriate level of theoretical sensitivity in analyzing focus group data that is appropriate for IS researchers. These guidelines should help IS researchers analyze observable verbal and non-verbal interactions with respect to the phenomenon of study but exclude (as a general rule) specialized psychological observations and analyses of the participants' internal states.

Secondly, as the IS field has matured, researchers have increasingly drawn on research from it: "IS is relying more on IS references, and the trend is distinctly positive" (Grover, Gokhale, Lim, Coffey, & Ayyagari, 2006, p. 291). These results suggest that the field is increasingly depending on its own knowledgebase as it strengthens its cumulative tradition. Journals such as *MISQ* and *CAIS* have published field-specific guidelines for research methodologies that range from formative and reflective construct specification (MacKenzie, Podsakoff, & Podsakoff, 2011) to literature analyses (Tate, Furtmueller, Evermann, & Bandara, 2015) and Bayesian structural equation modelling (Evemann & Tate, 2014). Similarly, leading IS conferences have increasingly included philosophy and research methods tracks. As such, we contribute to the growing corpus of within-field methodological guidelines. We make no claims, however, that our guidelines apply exclusively to IS. Our guidelines may be equally relevant for research problems of other applied business and management related fields that investigate the perceptions of a group of people towards a phenomenon of interest. In this respect, our study offers potential to contribute to another disciplinary trend that Grover et al (2006) identify: the increasing contribution of IS research to other fields.

These factors and IS research's multi-disciplinary characteristics and frequent social focus (e.g., studies of communication, business processes, outsourcing relationships, leadership style for IS management, which all consider people as a part of system) show that many IS studies would benefit from a richer analysis of different types of focus group data that includes verbal and non-verbal content and interaction data to investigate and answer their research questions. The potential benefits of the focus group method for the IS research clearly show the need to develop a clear and rigorous focus group data-analysis procedure for IS researchers. In this paper, we explain: the different types of focus group data, how to determine the level of precision required, and how to organize and prepare this data for analysis. Then, we present our focus group analysis framework illustrated with examples. Finally, we provide some recommendations on improving the trustworthiness of focus group data analysis.

2 Types of Focus Group Data

One can categorize focus group data into two main groups: content data and interaction data (Onwuegbuzie et al., 2009; Smithson, 2000; Nili, Tate, Johnstone, & Gable, 2014). One can obtain content data from transcripts of audio or video records and interaction data (e.g., when one or more participants agree, challenge, question, or support, or disagree with a participant's response) through reviewing video records or by detailed observation notes taken during the focus group.

Both content and interaction data can be verbal (in the form of words and sentences) and non-verbal. Non-verbal content data includes participants' expressing their opinion about a moderator's question (not in interaction with other participants) through moving their head and showing the extent or magnitude of something with their hands while answering a question. Non-verbal interaction data includes participants' disagreeing with other participants' opinions through a gesture, supporting their idea through facial expressions, or changing the loudness or pitch of their voice.

Non-verbal data can be used to help accurately interpret verbal expressions or even change their meaning. Some researchers have suggested that up to 90 percent of the communicative process is nonverbal (Fromkin & Rodman, 1983), which means that if only verbal expressions in research are analyzed, a rich data source will be lost. Non-verbal data can emphasize a verbal message (e.g., pausing before speaking, saying a word louder, or leaning forward while talking) or substitute for a verbal message (e.g., waving hands showing having no opinion about something). Research has shown that non-expert and ordinary people can accurately interpret the meaning of most non-verbal communications (Gabbott & Hogg, 2000; Gabbott & Hogg, 2001; Richards & Schmidt, 2014). Also, there is evidence (Fabri, Gerhard, Moore, & Hobbs, 1999) that simple and readily understandable non-verbal data (for non-experts) are sufficient to convey the meaning of social and interpersonal interactions. As such, strong justification exists for including non-verbal data when transcribing and analyzing focus group data to prevent meaning being lost.

One can also categorize non-verbal content and interaction data into four types: kinesic (movements and postures of body), proxemic (interpersonal space when expressing one's opinion), paralinguistic (e.g., changes in volume of voice and pitch), and choronemic (pace of speech and length of silence) (Onwuegbuzie et al., 2009; Onwuegbuzie, Leech, & Collins, 2010; Nili et al., 2014). Although paralinguistic and choronemic types are vocal, they are considered a non-verbal type because they are not clearly words or sentences. In fact, these two types of non-verbal data can be important by helping to clarify what people mean by their verbal response (e.g., emphasis of a word or a change in the loudness of voice, which implies a level of confidence in the response). Current literature has provided some ways of recognizing, collecting, documenting, and interpreting such data. For example, Onwuegbuzie et al. (2009) and Bloor, Frankland, Thoms and Robson (2001) provide examples of using symbols to help one collect all four types of non-verbal data during focus groups; Krauss, Chen, and Chawla (1996) and McNeil (1992) provide comprehensive typologies of non-verbal data; Onwuegbuzie et al. (2010) suggest a table to facilitate interpretation of non-verbal data; and Ekman (1972) suggests six fundamental non-verbal expressions of emotions (happiness, sadness, fear, anger, disgust, and surprise). Table 1 presents the different types of focus group data and some examples for each.

Table 1. Different Types of Focus Group Data

Types of data			Example
Content data	Verbal		Any participant comment or expressionin the form of words and/or sentences that can be taken at face value and does not require knowledge of any conversation/interaction that it may be embedded in.
	Non-verbal	Kinesic	• Bending down the whole body (showing shame); • Hanging head on chest (showing sadness); • Showing the extent or magnitude of something with hands.
		Proxemic	• Guard oneself, looking around, or opening hands (to express how a person feels about their personal space).
		Paralinguistic	• Loudness, tempo, or pitch fluctuation, to show the level of a participant's emphasis, or the extent that they believe in something.
		Choronemic	• A long period of silence, possibly indicating the participant does not have a ready answer, or is deeply thinking on an issue.
Interaction data	Verbal		Any participant's response, comment, or expression, to one or more people in the form of words and/or sentences.
	Non-verbal	Kinesic	• Clapping hands after hearing a well-considered response; • Expanding chest with head erect, possibly indicating a show of aggression towards a comment.
		Proxemic	• Getting close to a person to show friendship or affection.
		Paralinguistic	• Fluctuating pitch or changing the loudness of voice to remind a member of a group about something or to offer a clue.
		Choronemic	• Silence, which could express any of: a feeling of being treated disrespectfully, a desire to avoid intimacy, or to avoid disclosing any information in relation to a personal question.

The type and nature of the focus group data and the research question will determine the theoretical sensitivity of non-verbal focus group data. For example, studies in machine/human communication might require specialized knowledge and psychological training for the data analysis. However, for the majority of

IS research questions, we suggest that the additional levels of meaning conveyed by non-verbal data that are readily available to the non-specialist will likely be adequate for all practical purposes[1]. The first step of our analysis framework explains how to determine the theoretical sensitive types of data and the level of precision required to analyze them.

3 Design and Evaluation of a Framework for Analysis of Focus Groups

In this section, we explain how we designed our focus group data analysis framework and how we evaluated it both during and after its design to ensure its utility.

3.1 Designing the Framework

We sought to design a framework that could serve as a systematic and clear how-to guide for qualitatively analyzing different types of focus groups data in IS research. Such a framework would not be the only way that one could analyze focus group data, but it would suggest a systematic and rigorous way for both novice and experienced IS researchers to use the focus group method in their research.

We began to design the framework by reviewing the prior literature to determine the appropriate steps of a focus group data-analysis procedure. Specifically, we sought to build on what qualitative methodologists and focus groups experts have mentioned in prior literature. We reviewed journal papers (regardless of their rank), books, and highly ranked conference papers that focus on the analysis of focus group data. To find these sources, we searched a database of the entire social science and information systems research corpus available from our institution's library. We also checked the forward and backward citations, which extended our search process to health and nursing literature. We excluded any paper that does not specifically focus on the analysis aspect (e.g., focuses on planning and conducting) of focus groups and any paper that only criticizes the qualitative analysis of focus groups without suggesting any specific guidance or solution. After three rounds of selecting and evaluating papers, we found 11 journal papers that contribute ideas specifically for analyzing focus group data. These 11 papers mostly came from the health and nursing fields, which have extensively used the focus group method. The papers fell into three broad groups: 1) studies focused on analyzing focus group content data (Bertrand et al., 1992; Moretti et al., 2011; O'hEocha et al., 2012; Onwuegbuzie et al., 2009; Sim, 1998; Vicsek, 2007), 2) studies focused on analyzing interaction data (Rothwell, 2010; Grønkjær et al., 2011 Kitzinger, 1994), and 3) studies focused on analyzing both content and interaction data (Halkier, 2010; Duggleby, 2005).

According to these papers, two main approaches for analyzing focus group data exist: 1) deductive analysis (or "directed analysis" in which one identifies codes and categories based on an existing theory or prior research) and 2) inductive analysis (or "conventional analysis" in which one identifies codes and categories inductively from raw data and without any preconceived codes or perspectives). Unlike the deductive approach, which helps refine or extend a previous study's existing theory or findings, the inductive approach is useful where theory or prior research on a topic is limited; therefore, it can help one to achieve a richer understanding, to discover new ideas and insights about a phenomenon, and to develop a new theory (Halkier, 2010; Moretti et al., 2011). These eleven papers have mainly contributed ideas for the inductive approach of analyzing focus groups. We selected the inductive approach as our focus because of its contribution to achieving a richer understanding and novel findings that can contribute to developing new IS theories.

Next, we reviewed each paper in detail and synthesized their suggestions for analyzing focus group data. Such a synthesis could have been easier if the papers provided any specific analysis framework and if we could have put together and synthesized their suggested analysis steps (e.g., see Peffers, Tuunanen, Rothenberger, and Chatterjee (2007) for how they synthesized seven design science papers to design their own design methodology). However, none of these eleven papers suggest such sequential steps or framework. Therefore, the result of our synthesis was an "initial" process framework that comprised seven steps in a nominal sequence (see Table 2).

The steps of our analysis framework include 1) determining and organizing the theoretical sensitive types of data, 2) reviewing the whole raw organized data to get a sense of the whole and identify content areas (i.e., parts of transcript or observation field notes that directly relate to each other), 3) conducting a manifest

[1] While there may be specific exceptions, we would argue that IS studies that require extensive psychological training potentially suffer from "errors of inclusion" (Benbasat & Zmud, 2003) in that their main focus lie outside the IS field's boundaries

analysis of content data in each content area (i.e., analyzing the readily understandable parts of the organized data in each content area), 4) conducting a latent analysis of content data in each content area (i.e., analyzing the parts that need a high level of interpretation to understand their underlying meaning), 5) analyzing interaction data in each content area based on the interactions and discussions between participants, 6) integrating the results obtained through previous steps for each content area, and 7) integrating the results of all content areas and reporting the whole results. Appendix A briefly defines the frequently used concepts (e.g., content area, meaning unit, code, category, theme, etc.) in the qualitative analysis of focus groups and the different names that studies in the literature have called these concepts.

Table 2. The Steps of the Focus Group Data Analysis Framework

1. Determine and organize theoretically sensitive types of data	
2. Identify content areas	
In each content area	3. Conduct a manifest analysis of content data
	4. Conduct a latent analysis of content data
	5. Analyze interaction data
	6. Integrate the results in each content area (integrate the results obtained through steps 3 to 5)
7. Integrate and report the results of all previous steps for all content areas	

3.2 Evaluating the Framework

Next, we evaluated our framework as a design artifact to ensure its utility in achieving its goal. In other words, we evaluated the framework to establish its fitness to purpose by assessing both its relevance (i.e., its usefulness and applicability towards qualitative analysis of focus group data in IS research; Venable & Baskerville, 2012) and its rigor (i.e., establishing a low probability of yielding incorrect findings by using the framework; Venable & Baskerville, 2012). According to Venable and Baskerville (2012) and Peffers et al. (2007), evaluating a research method can be naturalistic (real users using a real purposeful artefact for a real research activity) or artificial (lacking at least one of these three realities) and is usually done either during or after the design process (Peffers et al., 2007). When evaluating the utility of a new method, or a new analysis framework, it is often necessary to employ analytical approaches such as making rational arguments, discussing the findings, and receiving feedback from experts in research methodology. One can also evaluate the rigor characteristic through limited trials of empirical evaluation by triangulating the findings via using a different method (Venable & Baskerville, 2012).

We evaluated the relevance and rigor of our framework both during and after its design. First, we evaluated the relevance of the research and the motivation for developing the framework by reviewing the ongoing debates and general discussions on information systems research. We believe that new or improved methods of data analysis have the potential to support new forms of theorizing.

When we consider some of the debates currently occurring in the field, such as Constantinides, Chiasson, and Introna's (2012) call for more consideration of ethics and power structures in IS research, Agarwal and Dhar's (2014) call for more theorizing based on the opportunity that big data presents, or Avison and Malauranet's (2014) call for data that "speaks for itself", we see opportunities for contributions made by focus group data. Analyzing the group interactions in a focus group that we discuss in Table 7 might surface abuses of power and position such as those that Constantinides et al. (2012) discuss. Identifying trends across focus groups based on analyzing a big data source (such as those advocated by Agarwal and Dhar (2014)) might add sufficient richness and insight to explain why the observed effects occurred. Focus group members' direct accounts and interactions could produce powerful, authentic data that speaks for itself as Avison and Malauranet (2014) advocate. For example, a chorus of widespread understanding and agreement to a position taken by one customer in a focus group might provide a powerful signal to marketers or designers about customer sentiment.

Next, we evaluated both the relevance and rigor aspects during the design process via discussion, peer review, and expert feedback that we received on the preliminary versions of the framework. This feedback did not result in our needing to significantly revise our initial framework; however, the feedback greatly helped us to refine and finalize the analysis steps and their sequence in our framework.

We also evaluated the relevance and the rigor aspects through the naturalistic approach after designing the framework. At this final stage, when evaluating relevance, we strictly focused on the usefulness, value, and

applicability of our framework for real projects, and, when evaluating rigor, we focused on the findings' reliability and on ensuring that the framework produced as few incorrect findings as possible. To do so, we conducted a research project in which we triangulated findings from three focus groups with the findings of 30 individual interviews. We analyzed the individual interviews with the highest possible level of scrutiny to identify any persistence factor that we might not have identified through the focus groups. Naturally, given that we triangulated with interview data, we did not identify any additional factors based on analyzing the interactions. However, analyzing the manifest and latent content from the individual interviews did not lead to any new result that we did not already identify through analyzing focus groups, suggesting that the focus group analysis framework is rigorous. We also found the framework to be applicable, useful, and easy to use.

4 The Analysis Framework

In this section, we explain each of the seven steps of our focus group analysis framework (Table 2) and include examples and tables to illustrate how to practically use it.

4.1 Determine and Organize Theoretically Sensitive Data

IS researchers usually determine the type of data they need at the early stages of their projects—typically in the design phase. However, they usually determine such data as being one or more of the big groups of qualitative and quantitative types of data based on the overall research approach (e.g., qualitative, quantitative, mixed method, design science, etc.). In addition, IS researchers frequently gain new ideas and insights toward their research phenomena as the research process goes on; therefore, they may need to re-check and justify the theoretical sensitive types of data during the entire research process. One usually determines, justifies, and organizes the specific types of theoretically sensitive focus group data (e.g., verbal and non-verbal content and interaction data) in the data-analysis phase and as the first step in analyzing focus group data. Due to the variety of topics and formulation of research questions in the IS research, it is unwise to be too prescriptive about what focus group data and at what level of precision one should include in the analysis. These factors will depend on the research question. One should base the decision to determine the theoretical sensitive data and the appropriate level of analysis on the relevant data to the research topic and the level of their contribution to the research questions (i.e., the concept of theoretical sensitivity) (Duggleby, 2005; Nili et al., 2014). For example, if detailed non-verbal content or interaction data does not contribute to answering the research questions, it is unnecessary to analyze them with a high level of precision. Many focus groups act as a sort of "group interview": where researchers would expect that the participants will stimulate discussion, but the individual, rather than the group, is the unit of analysis. A researcher may not need to consider detailed non-verbal interaction data for the studies that investigate how an IT user persists in solving an IT problem (as in our example) or the qualities a user expects in an employee portal. For these purposes, non-experts can accurately interpret the meaning of most non-verbal communications to the level that the research problem requires. A study where the unit of analysis is a group (e.g., one that examines the contribution of learning technology to group learning processes) might require more detailed attention on the group's non-verbal interactions. As a minimum, the researchers should transcribe and analyze readily understandable non-verbal content and interaction data that contributes to answering the research questions and that is significant enough that, if it is disregarded, it can cause misunderstanding or may change the meaning of the data. Hycner (1985, p. 285) advises: "(like verbal data) non-verbal and paralinguistic cues which significantly seem to emphasize or alter the literal meaning of the words should also be taken into account". However, analysts should justify the decision for the level of precision that they decide on to convince readers that they paid appropriate attention to all types of data. This decision and justification at the start of the analysis is even more important when multiple analysts analyze data for the same study to ensure consistency and the ability to evaluate inter-rater reliability.

After deciding what types of data and with what level of precision one should consider and analyze, rigorously analyze these data requires an efficient way of organizing them. In the following paragraphs, we suggest a format that helps one to efficiently organize all types of relevant verbal and non-verbal focus group data that participants provide. Our data organization format is extensible and can accommodate additional, more-specialized annotations and coding of non-verbal data if required.

Unlike some existing guidelines (e.g., Onwuegbuzie et al.'s (2010) matrix) that suggest one separately organize non-verbal data, we strongly suggest that one should consider non-verbal data (both non-verbal content and interaction data) in tandem with the associated verbal data (if it exists) because, first, there may

be situations where the analysts may misunderstand the meaning of verbal data if they do not report the verbal and non-verbal data together. Second, although in many situations non-verbal data by themselves may be meaningful (e.g., moving one's head down to show agreement with an idea), there may be situations where they are meaningless by themselves. For example, simply focusing on the movement of hands, such as repeatedly tapping fingers on the table, in order to demonstrate a participant's opinion, would not be significant without matching that movement to the verbal conversation.

Also, we suggest considering and reporting the non-verbal behavior such as the act of "smiling to participant x" (and, as mentioned, with its associated verbal data if any) rather than just "happy" or any basic emotion like the ones that Ekman (1972) suggest. For example, it is too simplistic to consider a participant's smile (to another participant while the first expresses an idea) as "happy" in a focus group environment because this smile may mean different things in different situations and with different verbal data. For example, it may suggest that one is encouraging another person to continue expressing an idea (a supportive behavior) or suggest that one thinks another person's idea has no value (a discouraging behavior). Also, in this example, the "happy" emotion is not of a significant value to help identify any theme through this interaction. In fact, the "smiling" act in this interaction (the example mentioned) may help to identify a theme such as "peer support".

Figure 1 represents our suggested format to help organize all types of data (verbal and non-verbal content and interaction data) gained through a focus group. In this figure, the vertical column presents the number of members who provide any type of data and the moderator of the focus group, and the cells of each horizontal row present all types of data that each participant and the moderator provide when they ask a question (or otherwise comment). This format organizes all data by time points members express their opinions. Therefore, in addition to the verbal and non-verbal content data, this data-organization format can efficiently present the verbal and non-verbal interaction (flow of interaction data) between interacting participants. However, because understanding whether an interaction is taking place and which members have been interacting with each other may be difficult for people other than analyst, we suggest that analysts should clarify which members interacted (e.g., through a symbol or writing "in response to participant x", etc.) in the related cells of the figure. We note that, when two or more cells in a column include data, those participants interacting at the same time provided that data. One can organize the data with spreadsheets, too, because they are easy means of doing so. However, if one uses tables or spreadsheets, one should clearly notify other members of the research team that the cells in the rows present the data based on time. We note that some cells of the figure may include either no data or one or more types of data (e.g., verbal and non-verbal data). Also, for the non-verbal type of data that each participant provides, the analyst may prefer to add a description of it (its type and meaning) in its related cell.

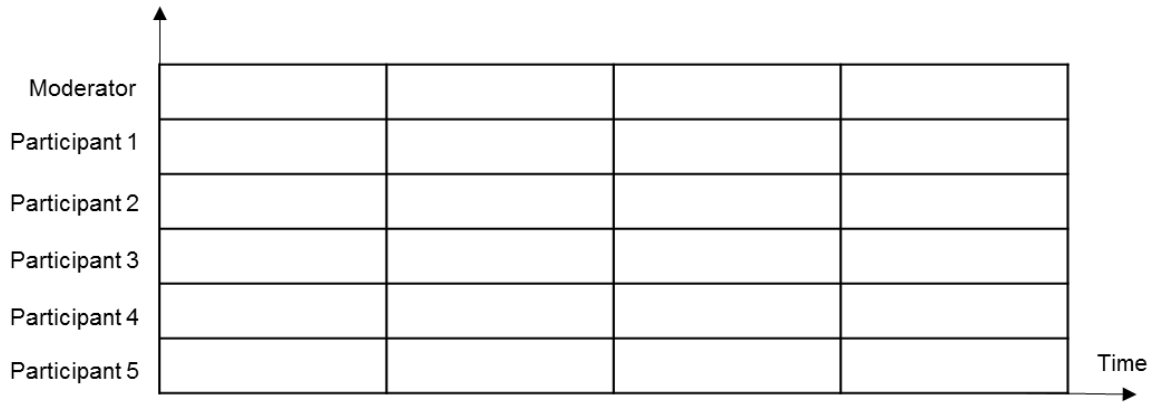

Figure 1. A Format for Organizing Focus Group Data

Appendix B presents a part of the organized data (four participants' comments in a long discussion among seven participants) obtained through a focus group with IT users at a university. The example is a relatively typical IS research question, which examines the research question "what factors contribute to user persistence with IT problem solving". We chose the focus group method to help stimulate participants recall their experiences and strategies for solving the problem, to encourage each participant to elaborate on their experience, and to identify factors that seem to be common to multiple participants. We remind readers that we organized the data in the table (Appendix B) by time; therefore, we obtained the data in the cells of the

fifth and sixth columns as the participants interacting at the same time. The table also presents some examples of some specialized non-verbal data.

4.2 Identify Content Areas

In this step, the analyst needs to read through the entire focus group transcript (or data organization table) at least twice to gain a sense of the whole and identify content areas (parts of the text such as paragraphs or sentences that are each about a similar concept, issue, and so on and that relate directly to each other). We suggest that, after identifying content areas, one should extract all related text and non-verbal data and merge all video records from the transcript. Doing so may lead to one's identifying several content areas presented separately, which makes the next phases of the analysis process easier.

For example, after reviewing the transcripts and video records of our example focus group several times, we identified six content areas: technology characteristics (e.g., sentences and paragraphs about the interactivity, ease of use, etc.), personal beliefs (e.g., technology self-efficacy and perceived control on solving the technology problem), quality of self-help information (e.g., sentences about the importance of up-to-date online instructions), situational factors (e.g., the availability and quality of online community of users), the final outcome (e.g., importance of achieving a satisfactory outcome), and users' perceived resources cost (e.g., time, effort, and money) of solving their IT problems. We note that the less-structured the focus group protocol, the more engagement this step requires.

4.3 Conduct a Manifest Analysis of Content Data

After identifying the content areas, the next task is to analyze the manifest content for each content area separately. For this phase of the analysis process, we suggest the following steps:

- Identify the meaning units in the manifest content of each content area and condense them into a description close to their original text (the wording of that meaning unit).
- Name/label each of these condensed meaning units with a code. We suggest writing these codes on a page/spreadsheet.
- Sort the codes into subcategories based on their similarities. One should then sort (further abstract) these subcategories into categories. One should label each of the subcategories with a name that represents its content. Similarly, one should label each category with a name that represents its subcategories. We note that this process of categorization may need several iterations.
- Express the overall interpretation of the underlying meaning of all categories in each content area via one theme.

Lastly, we suggest reporting the results of the previous steps (how data is linked with the codes, categories, and the themes in each content area) through a table. Table 3 shows an example of this presentation.

Table 3. An Example of the Format for Presenting the Manifest Content Analysis in a Content Area

<table>
<tr><th colspan="9">Theme (the overall interpretation of all categories in the content area)</th></tr>
<tr><th colspan="3" rowspan="2">Category 1</th><th colspan="4">Category 2</th><th colspan="2" rowspan="2">Category 3</th></tr>
<tr><th colspan="2">Subcategory 1</th><th colspan="2">Subcategory 2</th></tr>
<tr><td>Code 1</td><td>Code 2</td><td>Code 3</td><td>Code 4</td><td>Code 5</td><td>Code 6</td><td>Code 7</td><td>Code 8</td><td>Code 9</td></tr>
<tr><td>CMU 1</td><td>CMU 2</td><td>CMU 3</td><td>CMU 4</td><td>CMU 5</td><td>CMU 6</td><td>CMU 7</td><td>CMU 8</td><td>CMU 9</td></tr>
<tr><td>MU 1</td><td>MU 2</td><td>MU 3</td><td>MU 4</td><td>MU 5</td><td>MU 6</td><td>MU 7</td><td>MU 8</td><td>MU 9</td></tr>
<tr><td colspan="9">MU = meaning unit; CMU = condensed meaning unit.</td></tr>
</table>

For the same focus group example, Table 4 presents how we analyzed the manifest content of the content area about quality of self-help information.

Table 4. An Example of Presenting the Results of Manifest Content Analysis in a Content Area

Theme: self-help information quality							
Category 1: obtainability			**Category 2: usefulness**			**Category 3: presentation**	
Code 1: availability	Code 2: accessibility	Code 3: easiness	Code 4: timeliness	Code 5: relevancy	Code 6: completeness	Code 7: conciseness	Code 8: consistency
There is information in the discussion forum.	Different sorts of information are accessible.	Finding information via Google is easier than searching in the manuals	All the solution is for version 9 not for the latest version.	The information found via the search function is not always relevant.	The information on the screen is not complete.	There is so much information (more than what is needed).	There is different Information (on a problem) in different instructions.
"I see some people like you had talked about it in another forum and the discussion is there."	"I have access to different sorts of information online so I try to use them to fix it myself. Only when I don't know what to do, I ask a professional."	"I have found out that Google can find things in a manual of a software easier than when you search in the manual."	"I Googled first for the solution because they have a group, but all the solution is for version 9, not for the latest one…"	"If I put something in the search function, (it) is likely that similar words will be found but are not necessarily relevant."	"The (message on the screen) says I have to re-enter a password, but doesn't say what type of password."	"So much information, even though you try to be specific and use specific keywords. I ask, I just tend to ask a human being, how to do that"	"For one problem, you have got different information in different instructions."

4.4 Conduct a Latent Analysis of Content Data

After analyzing the manifest content, we suggest analyzing the latent content data via the following steps.

- Identify the meaning units in the latent content of each content area and condense them into a description close to the content area's original text.
- Concisely write the interpretation of each of these condensed meaning units.
- Based on the similarities between these condensed meaning units, abstract them into one or more subthemes with relevant headings/labels (i.e., the first step of data abstraction).
- Further abstract these subthemes by grouping them into one or more themes. We note that, depending on the contents of these themes, the label of one of these themes may be different or the same with the theme emerged in the previous phase.
- Lastly, we suggest reporting the results of the previous steps (how data is linked with the subthemes and the theme in each content area) through a table. Table 5 shows an example of this presentation.

Table 5. An Example of the Format for Presenting the Latent Content Analysis in a Content Area

Theme 1				**Theme 2 (=subtheme 3)**	**Theme *n***	
Subtheme 1		**Subtheme 2**			**Subtheme *k***	
Interpretation of CMU 1	Interpretation of CMU 2	Interpretation of CMU 3	Interpretation of CMU 4	Interpretation of CMU 5	Interpretation of CMU *x*	Interpretation of CMU *y*
CMU 1 close to text	CMU 2 close to text	CMU 3 close to text	CMU 4 close to text	CMU 5 close to text	CMU *x* close to text	CMU *y* close to text
MU 1	MU 2	MU 3	MU 4	MU 5	MU *x*	MU *y*

For our example (i.e., the focus group we mention above), Table 6 presents how we analyzed the latent content of the content area about the quality of self-help information.

Table 6. An Example of Presenting the Results of Latent Content Analysis in a Content Area

<table>
<tr><th colspan="6">Theme: self-help information quality</th></tr>
<tr><th colspan="2">Subtheme 1:
easiness (of obtaining information)</th><th>Subtheme 2:
contextualization</th><th colspan="2">Subtheme 3:
understandability</th><th>Subtheme 4:
believability</th></tr>
<tr><td>Companies can make obtaining information easier for users.</td><td>Obtaining required information is not easy.</td><td>Information is not provided based on related context.</td><td>Some messages are not understandable for every user.</td><td rowspan="2">Some information cannot be easily understood by every user.</td><td>Information provided by experts is believable.</td></tr>
<tr><td>Companies can provide specific information on specific products that can be obtained easily.</td><td>To obtain required information, you have to find a way and make lots of effort.</td><td>Relevant information cannot be found efficiently, as information have not been sorted based on related contexts.</td><td>I could not understand the message (from system), as it was very unusual and unclear.</td><td>You can always go back to a website which provides credible and expert opinion.</td></tr>
<tr><td>“If certain companies had like their own websites where they said, okay product A, if issues here then lookup this link and product B, lookup that link ...”</td><td>“You will have to go and find out what they are and sort it out yourself. And I was just thinking how bad. How the heck I am going to do that?”</td><td>“It comes up with a search function; what’s your problem? you type in the keywords, ‘there is nothing that matches these keywords’…you just put in ‘I have a problem’ and it gives numerous answers.”</td><td>“I could not discover (the message). It was very odd and unclear. It was my first time experiencing [it].”</td><td>“It sends you messages and you don't know what they mean.”</td><td>“A website where you think, Okay, those people have an idea what they talk about. You can always go back to that website and refer to it.”</td></tr>
</table>

4.5 Analyze Interaction Data

After conducting the manifest and latent analysis of content data, one needs to analyze interaction data (verbal interaction data and, if necessary, non-verbal interaction data). Like the verbal and non-verbal manifest and latent content data, one can view and obtain both verbal and non-verbal interaction data through the data organization table. We suggest the analysis of interaction data for two purposes: 1) to identify points of agreement or disagreement with ideas expressed during discussions and 2) to interpret the meaning of participants’ interactions that indicate things other than agreement or disagreement. The latter may also help to identify a new theme.

For the first purpose, we suggest looking at the data organization table and identifying how many participants agreed or disagreed (verbally or non-verbally) with a participant’s idea. However, we note that focus groups do not aim to empirically (not theoretically) generalize findings because, as Sim (1998) states, consensus, in this context, is more about “consensus across [multiple focus] groups in terms of the range of issues concerned” (p. 349) rather than in any specific focus group. Reporting the strength of each agreement or dissent (e.g., strongly, medium, weak) can also provide more insightful data, but one does not need to because “the apparent strength of opinion is context-specific, and does not necessarily represent some stable underlying intensity of feeling” (Sim, 1998, p. 349). However, considering these details and briefly discussing them (e.g., in the discussion section of a research paper) can provide a deeper insight about the topic of research and trustworthiness of its results.

For example, a participant’s idea in our example focus group (with seven participants) through which we identified the code “perceived cost” of solving problems with work related IT, two participants strongly agreed with this participant verbally, three participants agreed non-verbally (among which two participants agreed strongly), and one participant disagreed non-verbally and weakly. As most participants agreed with this code, we believe that more attention (e.g., from managers of the organization under study) should be paid toward users’ perceived cost of solving the problem and how this cost can be reduced.

For the second purpose (i.e., interpreting the meaning of two or more participants’ interactions), we suggest using our categorization of participants interactions (Table 7). We used Rothwell’s (2010) categories of small

group interactions, added "challenge" and "reference" categories, and considered "criticism" as a separate interaction category from "fight" interaction category (which includes "criticism" in Rothwell's study). The table also presents some examples and a specific definition for each of the categories. By "reference", we mean using or mentioning sources, such as prior research and TV shows, as evidence or to support one's own comment while interacting with other participants. By "challenge", we mean any participant's expression or behavior (e.g., asking a challenging question or asking other participants to imagine a challenging situation) that challenges other participants' minds; thus, the challenge type of interaction differs from criticism and argumentative behaviors.

Table 7. Types of Group Interaction

Types of interaction	Definition	Examples of common areas of IS studies
Criticism	Judgment and disapproval of an idea or opinion on the basis of perceived faults or mistakes.	Studies of organizational behavior, resistance to change, negotiation and collaborative work through interactive media, and conflict in small project group and internal staff context.
Fight	Argumentativeness, agitation, aggression, or hostility.	
Challenge	Inviting to engage in a debate, competition or argument about the truth of something.	
Flight	Evasion, an irrelevant expression, or showing isolation.	
Flight-pairing	Non-intimate (not willing to disclose information) or an irrelevant or avoidant expression.	
Dependency	Compliance, reliance or showing desire for direction.	Outsourcing relationships and leadership style for IS management.
Counter-dependency	Showing rejection or independency from the authority/leadership in the group.	
Pairing	Showing intimacy, friendship, desire for help or support.	Studies on social networks, social media, online reviews and group purchase behavior.
Counter-pairing	Avoiding intimacy and/or revealing personal information.	
Reference	Using or mentioning the source of information to support one's opinion or idea.	

As an example, using the data organization table (Appendix B for the content area in our focus group example), one participant commented "not sure, [if the system] is the source of error or something I have done in the past". In response to this participant, another participant mentioned "well, I teach human computer interaction. The problem is not me" while folding his arms. Therefore, considering the latter counter-pairing expression and the various "dependency" and "pairing" expressions and/or behaviors (e.g., facial expressions showing supportive behavior) from other participants in relation to this exchange, one can consider the theme "peer support"' or support the validity of this theme if one has already identified it via analyzing content data.

We could not identify any specific examples of how these participant interaction types have been identified and analyzed in a focus group of an IS stud, due to various reasons such as the lack of focus on analyzing participants' interactions (we discuss this issue in Section 1) and because one of the contributions of our paper is to offer new opportunities for IS research (e.g., theory building IS studies) based on analyzing focus group data. However, we offer some examples to show how this analysis might be relevant to IS research topics. Furneaux and Wade (2011) investigated organizational-level system discontinuance intentions. An organization or workgroup unit of analysis suits a focus group study well. Furneuax and Wade (2011) qualitatively developed their initial framework using semi-structured interviews, but they note that "it would have been possible [to use] focus groups" (p. 580). If we go on to consider the models presented in this paper and imagine these topics being discussed in a focus group context, we can see that detailed discussion of concepts such as institutional pressures and system embeddedness that relate to organizational politics might easily have yielded "fight" or "flight" behaviors in a focus group context if there was disagreement about which course of action to take. Topics such as system capability shortcomings

might have shown “pairing” behaviors between two or more system advocates two or more critics in a focus group if there were factions that supported change and factions that supported the status quo.

4.6 Integrate the Results in Each Content Area

In this phase, one integrates all subcategories and categories (from the manifest content analysis) and all subthemes and themes (from the latent content analysis) in each content area together into “subgroups” and “groups” for that content area to capture the overall results of data analysis for that content area. To report the result of this integration, in addition to a text that explains the results of this phase, we suggest using a table or a figure to present the results.

For example, Table 8 illustrates the results of this integration phase for the content area related to the quality of self-help information.

Table 8. An Example of Presenting the Results of the Last Step of Focus Group Data Analysis Framework

Group: self-help information quality										
Subgroup 1: obtainability			**Subgroup 2: usefulness**			**Subgroup 3: presentation**			**Subgroup 4: other**	
Availability	Accessibility	Easiness	Timeliness	Relevancy	Completeness	Conciseness	Consistency	Contextualization	Understandability	Believability

4.7 Integrate and Report the Results of All Content Areas

In the final step, one needs to report and present the results in an integrated way. Therefore, one should present all groups and subgroups of all content areas in a short text and/or through an illustration that summarizes the whole results. For such an illustration, we suggest drawing a table because previous steps also use them and because tables allow one to present the results in an efficient and easy-to-understand way. In this case, however, if space restrictions restrict one from presenting all content areas in a table, we suggest illustrating the results through a figure instead because figures can incorporate and present information in an integrated way.

A solid representation of the process and results of the focus group data analysis can provide a convincing presentation for those readers who seek a rigorous and trustworthy analysis and also to those readers who simply seek an overview of the analysis process and the results. Previous methodology literature (e.g., Glitz et al., 2001; Grønkjær et al., 2011; O'hEocha et al., 2012) and our experience show that complete focus group transcripts and complete presentation of its analysis are typically complex and lengthy—especially when they include non-verbal data. In addition to presenting an approach for analyzing focus group data, our framework presents a set of examples of how one can succinctly and effectively present excerpts from focus group data. We urge researchers to describe their analysis procedures and decisions (including the theoretical sensitivity of non-verbal data). Then, one can select selected excerpts using the framework and table formats we recommend.

5 Recommendations for Improving the Trustworthiness of Focus Group Data Analysis

As with qualitative research in general, the three measures of trustworthiness in research employing focus group method include: credibility (i.e., confidence in how well data and processes of analysis address the intended focus), transferability (i.e., the extent to which the findings of research enable other researchers to follow the process of the inquiry and transfer findings to other settings), and dependability (i.e., the degree to which changes and alterations are made in the analyst’s decisions during data analysis). Achieving each of these dimensions depends on the whole data-collection process and analysis procedure. Focusing on the qualitative analysis of focus groups, in order to achieve credibility, we suggest selecting meaning units that are not too broad or too narrow, clearly explaining the condensation and abstraction process, presenting

quotations that show participants interaction while discussing a topic (see the data organization table and Appendix B), showing representative quotations from transcripts in each of our suggested tables, and seeking agreement among research team and focus group participants to show how well the researchers identified categories and themes (i.e., to ensure the research team does not exclude any relevant data or include irrelevant data in the condensation and abstraction process) (Elo & Kyngäs, 2008; Graneheim & Lundman, 2004; Myers, 2013; Sim, 1998).

A research team can obtain dependability via frequent open dialogues (Graneheim & Lundman, 2004; Nili et al., 2014). Therefore, with multiple analysts (and especially when data is collected over time through multiple focus groups), step-by-step comparison of the results of each analysis step can improve dependability because it can minimize divergence in analysts' judgments about similarities and differences of data when identifying codes, categories, and themes. Presenting the results of each step in our suggested process (through the tables and/or figures explained) can facilitate open discussion among analysts and the research team overall.

Like the other two dimensions of trustworthiness, one can achieve transferability thorough clearly describing the focus group data-analysis process (Graneheim & Lundman, 2004; Nili et al., 2014) and not just richly presenting the final findings. Therefore, although one needs to clearly present and report the final results of the focus group data-analysis process, clearly and vigorously explaining and presenting each step of focus group data analysis plays a significant role in achieving transferability.

In general, trustworthiness of focus group data analysis highly depends on how clearly one presents the analysis process and results; clearly presenting this information allows readers to interpret it in different ways (Graneheim & Lundman, 2004; Krueger & Casey, 2014; Moretti et al., 2011). Our suggested systematic analysis process along with tables presented in the previous sections allow one to present a transparent and clear analysis process that help increase trustworthiness one's focus group data-analysis process and research results.

6 Conclusion

In this paper, we explain how the focus of information systems research on the interactions between people and technology motivated our developing a focus group analysis framework that is sufficiently sensitive to capture rich non-verbal data and interactions between individuals without involving the specialized psychological analysis required for research that would usually fall outside the IS field's boundaries. At the same time, we contribute to the growing trend of providing appropriate and focused methodological sources in the IS field rather than relying on reference fields for methodological guidance. We also hope that richer and more sophisticated guidelines can help scholars collect and analyze novel and rich focus group datasets, which can support interesting theoretical insights and solutions to business problems.

Among the extant research approaches and methods, social science and IS researchers have frequently challenged qualitative data-analysis methods as being unsystematic and ambiguous. Concerns regarding qualitative data-analysis process become even more critical when it comes to analyzing focus groups. Focus groups can provide different types of data (e.g., group-level verbal and non-verbal content and interaction data) that show higher levels of complexity and the corresponding demand for systematic, clear, and rich analysis guidelines. We explain that a significant part of IS research studies people as a part of system and that it can benefit from research data related to individuals' interactions. For such research, focus groups can provide useful and relevant types of data that one cannot obtain through any other method. Therefore, it is important that a clear and systematic focus group data-analysis framework is available for use by IS researchers.

In this paper, we suggest a seven step systematic and integrative framework for qualitatively analyzing different types of focus group data for IS researchers. We also explain how we evaluated (through presentations, discussions with experts, triangulation of findings in an actual empirical study, etc.) and ensured the relevance (usefulness and applicability), rigor, and value (ease of learning and use, etc.) of our framework both during and after its design. Future research in various IS topics (especially those studies in which interaction data is of theoretical sensitive importance) can further test our framework's robustness. However, because few methodological studies and guidelines on how to analyze focus group data exist in many fields (e.g., different management fields, healthcare, and education), our framework may be useful for researchers in other social science and business fields as well.

We note that projects that qualitatively analyze data can be unique and that their level of theoretical sensitivity and data abstraction and integration can vary. So, it should not be surprising if we see that, even with a clear focus group analysis procedure in hand, one still cannot easily rigorously analyze focus group data—a factor that can contribute to the challenge and enjoyment of analyzing focus group data.

References

Agarwal, R., & Dhar, V. (2014). Big data, data science, and analytics: The opportunity and challenge for IS research. *Information Systems Research*, *25*(3), 443-448.

Avison, D., & Malaurent, J. (2014). Is theory king? Questioning the theory fetish in information systems. *Journal of Information Technology*, *29*(4), 327-336.

Barrosso, J. (1997). Social support and long-term survivors of AIDS. *Western Journal of Nursing Research, 19*(5), 554-582.

Baxter, L.A. (1991). Content analysis. In B. M. Montgomery & S. Duck (Eds.), *Studying interpersonal interaction* (239-254). New York: The Guilford Press.

Belanger, F. (2012). Theorising in information systems research using focus groups. *Australasian Journal of Information Systems, 17*(2), 109-135.

Benbasat, I., & Zmud, R. (2003). The identity crisis within the IS discipline: Defining and communicating the disciplines core properties. *MIS Quarterly, 27*(2), 183-194.

Bertrand, J. T., Brown, J. E., & Ward, V. M. (1992). Techniques for analyzing focus group data. *Evaluation Review, 16*(2), 198-209.

Bloor, M., Frankland, J., Thoms, M., & Robson, K. (2001). *Focus groups in social research*. Thousand Oaks, CA: Sage.

Cavanagh, S. (1997). Content analysis: Concepts, methods and applications. *Nurse Researcher, 4*(3), 5-16.

Chen, W. S., & Hirschheim, R. (2004). A paradigmatic and methodological examination of information systems research from 1991 to 2001. *Information Systems Journal*, *14*(3), 197-235.

Constantinides, P., Chiasson, M., & Introna, L. (2012). The ends of information systems research: A pragmatic framework. *MIS Quarterly*, *36*(1), 1-10.

Duggleby, W. (2005). What about focus group interaction data? *Qualitative Health Research, 15*(6), 832-840.

Einasto, O. (2014). Investigating e-service quality criteria for university library: A focus group study. *New Library World*, *115*(1/2), 4-14.

Ekman, P. (1972). *Universal and cultural differences in facial expressions of emotion*. In J. R. Cole (Ed.), *Nebraska symposium on motivation* (pp. 207-283). Lincoln: University of Nebraska Press.

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing, 62*(1), 107-115.

Evermann, J., & Tate, M. (2014). Bayesian structural equation models for cumulative theory building in information systems—a brief tutorial using BUGS and R. *Communications of the Association for Information Systems*, *34*, 1481-1515.

Fabri, M., Gerhard, M., Moore, D. J., & Hobbs, D. J. (1999). Cognitive processes in collaborative virtual environments. In *Proceedings of the 17th Eurographics-UK Conference*.

Fromkin, V., & Rodman, J. (1983). *An introduction to language.* New York: CBS College Publishing.

Furneaux, B., & Wade, M. (2011). An exploration of organizational level information systems discontinuance intentions. *MIS Quarterly*, *35*(3), 573-598.

Gabbott, M., & Hogg, G. (2000). An empirical investigation of the impact of non-verbal communication on service evaluation. *European Journal of Marketing*, *34*(3/4), 384-398.

Gabbott, M., & Hogg, G. (2001). The role of non-verbal communication in service encounters: A conceptual framework. *Journal of Marketing Management*, *17*(1-2), 5-26.

Galliers, R. D. (1991). *Choosing appropriate information systems research approaches: A revised taxonomy*. In H.-E., Nissen, H. K. Klein, & R. Hirschheim, (Ed.), *Information systems research: Contemporary approaches and emergent traditions* (pp.327-345). North Holland: Elsevier Science Publishers.

Glitz, B., Hamasu, C., & Sandstrom, H. (2001). The focus group: A tool for programme planning, assessment and decision-making—an American view. *Health Information & Libraries Journal, 18*(1), 30-37.

Graneheim, U. H., & Lundman, B. (2004). Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today, 24*(2), 105-112.

Grønkjær, M., Curtis, T., de Crespigny, C., & Delmar, C. (2011). Analysing group interaction in focus group research: Impact on content and the role of the moderator. *Qualitative Studies*, *2*(1), 16-30.

Grover, V., Gokhale, R., Lim, J., Coffey, J., & Ayyagari, R. (2006). A citation analysis of the evolution and state of information systems within a constellation of reference disciplines. *Journal of the Association for Information Systems*, *7*(5), 270-325.

Grover, V., & Lyytinen, K. (2015). New state of play in information systems research: The push to the edges. *MIS Quarterly*, *39*(2), 271-296.

Halkier, B. (2010). Focus groups as social enactments: Integrating interaction and content in the analysis of focus group data. *Qualitative Research, 10*(1), 71-89.

Hirschheim, R. (1985). *Information systems epistemology: An historical perspective*. In E. Mumford, G. Fitzgerald, R. Hirschheim, & A. T. Wood-Harper (Ed.). *Research methods in information systems* (pp. 9-33), Amsterdam, Netherlands: Elsevier Science.

Hundley, H. L., & Shyles, L. (2010). US teenagers' perceptions and awareness of digital technology: A focus group approach. *New Media & Society*, 1-17.

Hsieh, H. F., & Shannon, SE. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(9), 1277-1288.

Hycner, R. H. (1985). Some guidelines for the phenomenological analysis of interview data. *Human studies*, *8*(3), 279-303.

Kitzinger, J. (1994). The methodology of focus groups: The importance of interaction between research participants. *Sociology of Health & Illness*, *16*(1), 103-121.

Krauss, R. M., Chen, Y., & Chawla, P. (1996). Nonverbal behavior and nonverbal communication: What do conversational hand gestures tell us? *Advances in Experimental Social Psychology*, *28*, 389-450.

Krueger, R. A., & Casey, M. A. (2014). *Focus groups: A practical guide for applied researchers* (5th ed.). Thousand Oaks, CA: Sage.

Krueger, R. A. (1997). *Analyzing and reporting focus group results*. Thousand Oaks, CA: Sage.

Krueger, R. A. (2006). Analyzing focus group interviews. *Journal of Wound Ostomy & Continence Nursing*, *33*(5), 478-481.

Liamputtong, P. (2011). *Focus group methodology: Principle and practice*. Thousand Oaks, CA: Sage.

MacKenzie, S. B., Podsakoff, P. M., & Podsakoff, N. P. (2011). Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques. *MIS Quarterly*, *35*(2), 293-334.

McNeill, D. (1992). *Hand and mind: What gestures reveal about thought*. Chicago: University of Chicago Press.

Moretti, F., van Vliet, L., Bensing, J., Deledda, G., Mazzi, M., Rimondini, M., Zimmermann, C., & Fletcher, I. (2011). A standardized approach to qualitative content analysis of focus group discussions from different countries. *Patient Education and Counseling*, *82*(3), 420-428.

Myers, M. D. (2013). *Qualitative research in business and management*. Thousand Oaks, CA: Sage.

Nili, A., Tate, M., Johnstone, D., & Gable, G. G. (2014). A framework for qualitative analysis of focus group data in information systems. In *Proceedings of the Australasian Conference on Information Systems.*

O'hEocha, C., Wang, X., & Conboy, K. (2012). The use of focus groups in complex and pressurised IS studies and evaluation using Klein & Myers principles for interpretive research. *Information Systems Journal*, *22*(3), 235-256.

Onwuegbuzie, A. J., Dickinson, W. B., Leech, N. L., & Zoran, A.G. (2009). A qualitative framework for collecting and analyzing data in focus group research. *International Journal of Qualitative Methods, 8*(3), 1-21.

Onwuegbuzie, A. J., Leech, N. L., & Collins, K. M. (2010). Innovative data collection strategies in qualitative research. *Qualitative Report*, *15*(3), 696-726.

Orlikowski, W. J., & Baroudi, J. J. (1991). Studying information technology in organizations: Research approaches and assumptions. *Information Systems Research*, *2*(1), 1-28.

Parent, M., Gallupe, R. B., Salisbury, W. D., & Handelman, J. M. (2000). Knowledge creation in focus groups: Can group technologies help? *Information & Management*, *38*(1), 47-58.

Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems*, *24*(3), 45-77.

Ramiller, N. C., & Pentland, B. T. (2009). Management implications in information systems research: The untold story. *Journal of the Association for Information Systems*, *10*(6), 447-494.

Richards, J. C., & Schmidt, R. W. (2014). *Language and communication*. New York, NY: Routledge.

Rothwell, E. (2010). Analyzing focus group data: Content and interaction. *Journal for Specialists in Pediatric Nursing, 15*(2), 176-180.

Smithson, J. (2000). Using and analysing focus groups: Limitations and possibilities. *International Journal of Social Research Methodology*, *3*(2), 103-119.

Sim, J. (1998). Collecting and analysing qualitative data: Issues raised by the focus group. *Journal of Advanced Nursing, 28*(2), 345-352.

Stahl, B. C., Tremblay, M. C., & LeRouge, C. M. (2011). Focus groups and critical social IS research: How the choice of method can promote emancipation of respondents and researchers. *European Journal of Information Systems, 20*(4), 378-394.

Stewart, D. W., & Shamdasani, P. N. (2014). *Focus groups: Theory and practice*. Thousand Oaks, CA: Sage.

Tate, M., & Evermann, J. (2009). Perceptive users with attitudes—some hueristics on theorizing. In *Proceedings of the International Conference on Information Systems.*

Tate, M., Furtmueller, E., Evermann, J., & Bandara, W. (2015). Introduction to the special issue: The literature review in information systems. *Communications of the Association for Information Systems*, *37*, 103-111.

Tremblay, M. C., Hevner, A. R., & Berndt, D. J. (2010). Focus groups for artifact refinement and evaluation in design research. *Communications of the Association for Information Systems*, *26*, 599-618.

Venable, J., & Baskerville, R. (2012). Eating our own cooking: Toward a more rigorous design science of research methods. *The Electronic Journal of Business Research Methods, 10*(2), 141-153.

Vicsek, L. (2007). A scheme for analyzing the results of focus groups. *International Journal of Qualitative Methods*, *6*(4), 20-34.

Wilkinson, S. (2004). *Focus group research*. In D. Silverman (Ed.), *Qualitative research: Theory, method, and practice* (pp. 177-199). Thousand Oaks, CA: Sage.

Zhang, Z., & Gu, C. (2015). Effects of consumer social interaction on trust in online group-buying contexts: An empirical study in china. *Journal of Electronic Commerce Research*, *16*(1).

Appendix A: Frequently Used Concepts in Focus Group Data Analysis

Table A1. Frequently Used Concepts in Focus Group Data Analysis

Concept	Definition
Content area	A content area is parts of the text such as paragraphs or sentences each of which is about a similar concept, issue, etc. and are directly related to each other. In the literature, a content area has also been called a domain, rough structure or a cluster (Elo & Kyngäs, 2008; Graneheim & Lundman, 2004; Nili et al., 2014).
Manifest content	Parts (sentences, paragraphs, etc.) of the transcript and observation field notes with clear meaning (there is no need for a high level of interpretation) and meaning that multiple analysts agree with (Elo & Kyngäs, 2008; Graneheim & Lundman, 2004; Nili et al., 2014).
Latent content	Parts of the transcript and observation field notes that need a higher level of interpretation and require more discussion among research team to understand and agree on what the text talks about (Elo & Kyngäs, 2008; Graneheim & Lundman, 2004; Nili et al., 2014).
Meaning unit	Graneheim and Lundman's (2004, p. 106) define meaning unit as "words, sentences or paragraphs containing aspects related to each other through their content and context" (a definition we adopt in this study). This concept also has been called "idea unit", "content unit", "coding unit" (Baxter, 1991), "textual unit", and even "theme" (Graneheim & Lundman, 2004; Nili et al., 2014).
Condensation	Shortening a text without changing the quality of its concept. Condensation also has been called reduction and distillation (Cavanagh, 1997; Elo & Kyngäs, 2008; Graneheim & Lundman, 2004; Nili et al., 2014).
Abstraction	The process of grouping together the condensed text on varying levels such as codes and concluding subcategories, categories and themes. Abstraction also has been called aggregation (Barrosso, 1997; Elo & Kyngäs, 2008; Graneheim & Lundman, 2004; Nili et al., 2014).
Code	A label/name, a colour, or a number assigned to a condensed meaning unit (Elo & Kyngäs, 2008; Hsieh & Shannon, 2005; Nili et al., 2014). In the analysis framework of this paper, by code we mean use of labels in the analysis process.
Category	A group of similar codes and may consists of a number of subcategories. 'Category' expresses the manifest content of the transcript and answers the question 'what?' As categories are exhaustive and mutually exclusive, no data can fit into more than one category and no data must be excluded due to lack of an appropriate category (Elo & Kyngäs, 2008; Graneheim & Lundman, 2004; Hsieh & Shannon, 2005; Nili et al., 2014).
Theme	"A thread of an underlying meaning through, condensed meaning units, codes or categories, on an interpretative level" (i.e., the expression of the latent content) (Graneheim & Lundman, 2004 p. 107). A theme may include subthemes and answers the question 'how?'. As themes are not necessarily mutually exclusive, one or more condensed meaning units and even codes and categories may fit into more than one theme (Elo & Kyngäs, 2008; Nili et al., 2014).

Appendix B: An Example of Focus Group Data Organization

Table B1. An Example of Focus Group Data Organization

Moderator	Do you know where the origin of the system error is?					
Participant 1				VCD: It must be my fault…my son comes (and says) "there it is mum". …I haven't seen it NVCD: The head is positioned to face down with a neutral mouth (i.e., shame)	To P5 while he is expressing his opinion: NVID: smiling (i.e., intimacy and support).	All participants [at the same time] NVID: Laughing with crescent-shaped eyes (i.e., agreement with P5's comment). [in addition to this interaction by all participants]: NVID: P4 points out to the moderator through moving eyebrows (expressing her agreement with P5's comment)
Participant 2			To all participants: VID: I teach Human Computer Interaction, the problem is not me NVID: Folding arms (i.e., independency and authority).		To P5 while he is expressing his opinion: NVID: smiling (i.e., intimacy, support, and agreement).	
Participant 4		To the moderator and all participants: VID: … not sure, (the system) is the source of error or something I have done in the past. NVCD: Forehead scrunched up, one eyebrow raised higher than the other (i.e., uncertainty).			To P5 while he is expressing his opinion: NVID: smiling (i.e., intimacy and support).	
Participant 5					To all participants: VID: It is somewhere in the middle where I say how much of this is my fault and how much is the system. NVD: Hands pointing out to P2 and P1.	

P = Participant, VCD = verbal content data, NVCD = non-verbal content data, VID = verbal interaction data, and NVID = non-verbal interaction data.

About the Authors

Alireza Nili did his PhD research in Information Systems at Victoria University of Wellington (VUW). He has taught several courses in the areas of business information systems and e-commerce and has contributed to teaching the focus group method to doctoral students at VUW. His teaching and research interests are in the areas of qualitative research methods, digital services, user behavior and decision making, business systems analysis, e-marketing, and increasingly in the area of design science methodology.

Mary Tate is a Research Fellow (DECRA) at Queensland University of Technology, and a Senior Lecturer at Victoria University of Wellington, New Zealand. She is the author of more than 50 peer-reviewed publications, and her work has been presented in journals such as *Journal of the Association for Information Systems*, *Information and Management, The International Journal of Information Management*, and *Communications of the Association for Information Systems* as well as at leading international conferences. Her research focusses on digital services, IS foundations and research methods, and literature analysis.

David Johnstone is a Senior Lecturer in Information Systems at Victoria University of Wellington. David has published in journals such as *European Journal of Information Systems, Information Systems Frontiers,* and *Behaviour and Information Technology,* as well as leading information systems conferences. David's research has focused on IT project governance, human information behaviour and literature analysis.